OCCUPATIONAL ANALYSES SERIES

Sheet Metal Worker

2006

Human Resources and Social Development Canada
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Occupational Analyses Series

Sheet Metal Worker

2006

Trades and Apprenticeship Division

Human Resources
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The Canadian Council of Directors of Apprenticeship (CCDA) recognizes this Occupational Analysis as the national standard for the occupation of Sheet Metal Worker.

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OTHER RELATED OCCUPATIONAL TITLE

This analysis covers tasks performed by sheet metal workers whose occupational title has been identified by some provinces and territories of Canada by the name of Tinsmith.

LIST OF RED SEAL NATIONAL OCCUPATIONAL ANALYSES

TITLE	NOC* Code
Appliance Service Technician (2005)	7332
Automotive Painter (2005)	7322
Automotive Service Technician (2005)	7321
Baker (2006)	6252
Boilermaker (2003)	7262
Bricklayer (2000)	7281
Cabinetmaker (2000)	7272
Carpenter (2005)	7271
Concrete Finisher (2006)	7282
Construction Electrician (2003)	7241
Cook (2003)	6242
Electrical Rewind Mechanic (1999)	7333
Electronics Technician – Consumer Products (1997)	2242
Farm Equipment Mechanic (2000)	7312
Floorcovering Installer (2005)	7295
Glazier (2004)	7292
Hairstylist (2005)	6271
Heavy Duty Equipment Technician (2004)	7312
Industrial Electrician (2003)	7242
Industrial Instrument Mechanic (2000)	2243
Industrial Mechanic (Millwright) (1999)	7311
Insulator (Heat and Frost) (2000)	7293
Ironworker (Generalist) (1993)	7264
Lather (Interior Systems Mechanic) (2002)	7284
Machinist (2005)	7231
Metal Fabricator (Fitter) (2003)	7263

Mobile Crane Operator (2006)	7371
Motorcycle Mechanic (1995)	7334
Motor Vehicle Body Repairer (Metal and Paint) (2005)	7322
Oil Burner Mechanic (2006)	7331
Painter and Decorator (2000)	7294
Partsperson (2005)	1472
Plumber (2003)	7251
Powerline Technician (2004)	7244
Recreation Vehicle Mechanic (2000)	7383
Refrigeration and Air Conditioning Mechanic (2004)	7313
Roofer (2006)	7291
Sheet Metal Worker (2006)	7261
Sprinkler System Installer (2003)	7252
Steamfitter – Pipefitter (1996)	7252
Tilesetter (2004)	7283
Tool and Die Maker (2005)	7232
Transport Trailer Technician (2003)	7321
Truck and Transport Mechanic (2000)	7321
Welder (2004)	7265

* National Occupational Classification

Requests for these publications should be forwarded to:

Trades and Apprenticeship Division
Human Resources Partnerships
Human Resources and Skills Development Canada
140 Promenade du Portage, Phase IV, 5th Floor
Gatineau, Quebec K1A 0J9

These publications are also available to order or download online at: **www.red-seal.ca**.

A comparative listing of apprenticeship training programs across Canada may be accessed at **www.ellischart.ca**. The Ellis Chart also lists the current provincial and territorial trade names.

FOREWORD

The first National Conference on Apprenticeship in Trades and Industries, held in Ottawa in 1952, recommended that the federal government be requested to co-operate with provincial and territorial apprenticeship committees and officials in preparing analyses of a number of skilled occupations. To this end, Human Resources and Skills Development Canada (HRSDC) sponsors a program, under the guidance of the Canadian Council of Directors of Apprenticeship (CCDA), to develop a series of occupational analyses.

The Occupational Analysis Program has the following objectives:

- to identify and group the tasks performed by skilled workers in particular occupations;
- to identify those tasks that are performed by skilled workers in every province and territory;
- to develop instruments for use in the preparation of Interprovincial Standards "Red Seal" Examinations and curricula for training leading to the certification of skilled workers;
- to facilitate the mobility, in Canada, of apprentices and skilled workers;
- to supply employers and employees, and their associations, industries, training institutions and governments with analyses of the tasks performed in particular occupations.

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GUIDE TO ANALYSIS

DEVELOPMENT OF ANALYSIS

A draft analysis is developed by a committee of industry experts in the field led by a team of facilitators. This draft analysis identifies all the tasks performed in the occupation.

The draft is translated and reviewed by the NOA Team of HRSDC. A copy of this analysis is then forwarded to provincial/territorial authorities for review by specialists in the field. Their recommendations are assessed and incorporated into the final draft.

The occupational analysis is published in both official languages.

STRUCTURE OF ANALYSIS

To facilitate understanding of the nature of the occupation, the work performed is divided into the following divisions:

BLOCK – is the largest division within the analysis and reflects a distinct operation relevant to the occupation.

TASK – is the distinct activity that, combined with others, makes up the logical and necessary steps the worker is required to perform to complete a specific assignment within a "BLOCK".

SUB-TASK – is the smallest division into which it is practical to subdivide any work activity and, combined with others, fully describes all duties constituting a "TASK".

Supporting Knowledge & Abilities

The elements of skill and knowledge that an individual must acquire to adequately perform the sub-task.

Trends

Any shifts or changes in technology that affect the block.

Related Components

All components related to a specified block being undertaken by the sheet metal worker.

Tools and Equipment

All tools and equipment necessary for the sheet metal worker to perform the work on all given tasks identified within the block.

Context

A statement written to clarify the intent and meaning of tasks in the analysis.

VALIDATION METHOD

At the request of the Canadian Council of Directors of Apprenticeship (CCDA), the Standardization Sub-committee developed a method for validating the Red Seal National Occupational Analyses.

A draft of the analysis is sent to all jurisdictions for validation. Each jurisdiction rates the sub-tasks and applies percentage ratings to blocks and tasks. This method for the validation of the National Occupational Analysis identifies common core tasks across Canada for a specific occupation. This feature facilitates the weighting of the Interprovincial Standards "Red Seal" Examinations.

DEFINITIONS

YES: the sub-task is performed by workers in the occupation in a specific jurisdiction.

NO: the sub-task is not performed by workers in the occupation in a specific jurisdiction.

BLOCK %: the average number of questions (items), derived from the collective decision made by workers within the occupation from all areas of Canada, that will be placed on an interprovincial examination to assess each block of the analysis.

TASK %: the average number of questions (items), derived from the collective decision made by workers within the occupation from all areas of Canada, that will be placed on an interprovincial examination to assess each task of the analysis.

NV: Not Validated by a province/territory.

ND: Not Designated in a province/territory.

PROVINCIAL/TERRITORIAL ABBREVIATIONS

NL: Newfoundland and Labrador
NS: Nova Scotia
PE: Prince Edward Island
NB: New Brunswick
QC: Quebec
ON: Ontario
MB: Manitoba
SK: Saskatchewan
AB: Alberta
BC: British Columbia
NT: Northwest Territories
YT: Yukon
NU: Nunavut

COMMON CORE

The criteria for determining common core depend on the performance of sub-tasks. If at least 70% of the responding jurisdictions (excluding NVs and NDs) perform a sub-task, it shall be considered common core.

Interprovincial Standards "Red Seal" Examinations are based on the common core identified through this validation process. Validation identifies what will be assessed through the interprovincial examination.

BLOCK AND TASK WEIGHTING (APPENDIX C)

This appendix represents the block and task percentages as submitted by each jurisdiction.

Each jurisdiction, with the use of a provincial/territorial occupational advisory committee, validates the content, places percentages on blocks and tasks, and indicates whether or not the sub-tasks are performed by the skilled workers within the occupation. The results of this exercise are submitted to the NOA Team who then analyzes the data and develops this appendix which provides the individual jurisdictional validation results as well as the national averages of all responses.

PIE CHART (APPENDIX D)

The graph depicts the national percentages assigned to blocks in the analysis.

SCOPE OF THE SHEET METAL WORKER OCCUPATION

Sheet metal workers design, fabricate, assemble, install and repair sheet metal products. In fabrication work, sheet metal workers lay out and measure pieces to specifications. They use tools such as power shears, press brakes, drill presses and computerized cutting equipment to cut and shape material. They assemble and join the pieces using various techniques such as welding and using mechanical fasteners.

They work with black iron, galvanized steel, stainless steel, aluminium, copper, brass, nickel, tin plate and other alloys. Some may also work with fibreglass, ceramics, plastics and other metal substitutes.

Pieces may be laid out and cut in the shop and assembled on construction or industrial sites. Sheet metal workers may specialize in onsite installation, shop manufacture, or servicing and maintenance of installed equipment and systems. Those who work in installation may specialize in heating, ventilation and air conditioning (HVAC), boiler lagging / vessel cladding, roofing products, architectural sheet metal, custom metal products, food service products, secondary systems for environmental projects, pneumatic conveyance or signage.

Employers in this trade include sheet metal fabrication shops, manufacturing companies of sheet metal, and air conditioning and heating contractors. Sheet metal workers may be involved in residential, industrial, commercial, institutional and construction sectors.

Key attributes for people entering this trade are mechanical and mathematical aptitude, hand-eye coordination, spatial perception and manual dexterity. Good physical condition is important because the work often requires considerable standing, climbing, lifting and carrying.

Hazards of the trade include working with sharp metal pieces, working at heights and heat from welding and cutting processes. Sheet metal workers often have to work in adverse weather and environmental conditions.

Experienced sheet metal workers may become specialists in design and layout, estimators, supervisors or business owners.

OCCUPATIONAL OBSERVATIONS

New clean air regulations and a demand for improved energy-efficiency and air quality in buildings has led to increased need for quality installation and maintenance of air handling systems and components. Many older systems are being replaced with new systems that improve indoor air quality.

Sheet metal components are increasingly being prefabricated with computerized shop equipment. This has lead to increased productivity in fabrication shops.

There is increasing variety in materials such as plastics, fiberglass, ceramics and other metal substitutes.

There are region-specific concerns (for example, seismic upgrading in construction work on the west coast) related to the sheet metal industry. These concerns are addressed in regional codes and regulations.

SAFETY

Safe working procedures and conditions, accident prevention and the preservation of health are of primary importance to industry in Canada. These responsibilities are shared and require the joint efforts of government, employers and employees. It is imperative that all parties are aware of circumstances and conditions that may lead to injury or harm. Safe learning experiences and environments can be created by controlling the variables and behaviours that may contribute to accidents or injury.

It is generally recognized that a safety-conscious attitude and work practices contribute to a healthy, safe and accident-free working environment.

It is imperative to apply and be familiar with the Occupational Health and Safety Acts and Workplace Hazardous Materials Information System (WHMIS) Regulations. As well, it is essential to determine workplace hazards and take measures to protect oneself, co-workers, the public and the environment.

As safety education is an integral part of training in all jurisdictions, personal safety practices are not recorded in this document. However, the technical safety aspect relating to each task and sub-task are included throughout this analysis.

ANALYSIS

BLOCK A

OCCUPATIONAL SKILLS

Trends: *Communication with cell phones, fax machines and digital cameras has increased. There is more emphasis on safety concerns and safe work practices.*

Related Components: Not applicable.

Tools and Equipment: See Appendix A.

Task 1 Uses tools and equipment.

Context: *The use of tools and equipment is important to sheet metal workers in order to perform their tasks. Using appropriate tools increases efficiency and product quality.*

Sub-task

1.01 Uses hand tools.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

Supporting Knowledge & Abilities

1.01.01	knowledge of types of hand tools
1.01.02	knowledge of hand tool operating procedures
1.01.03	knowledge of limitations of use of hand tools
1.01.04	ability to organize hand tools
1.01.05	ability to select hand tools
1.01.06	ability to clean hand tools
1.01.07	ability to maintain hand tools
1.01.08	ability to store hand tools
1.01.09	ability to recognize worn, damaged or defective hand tools

Sub-task

1.02 Uses portable power tools.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

1.02.01	knowledge of types of power tools
1.02.02	knowledge of power tool operating procedures
1.02.03	knowledge of limitations of use of power tools
1.02.04	ability to organize power tools
1.02.05	ability to select power tools
1.02.06	ability to locate power source such as generator and outlets
1.02.07	ability to clean power tools
1.02.08	ability to maintain power tools
1.02.09	ability to store power tools
1.02.10	ability to recognize worn, damaged or defective power tools

Sub-task

1.03 Uses shop tools and equipment.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

1.03.01	knowledge of types of shop tools and equipment
1.03.02	knowledge of shop tool and equipment operating procedures such as set-up and adjustment
1.03.03	knowledge of limitations of use of shop tools and equipment

1.03.04	ability to select shop tools and equipment
1.03.05	ability to clean shop tools and equipment
1.03.06	ability to maintain shop tools and equipment
1.03.07	ability to recognize worn, damaged or defective shop tools and equipment

Sub-task

1.04 Uses welding/cutting equipment.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

1.04.01	knowledge of types of welding/cutting equipment such as Shielded Metal Arc Welding (SMAW, also called stick or arc welding), Metal Inert Gas welding (MIG welding), Tungsten Inert Gas welding (TIG welding), plasma and oxy-acetylene
1.04.02	knowledge of materials to be welded such as black iron, stainless steel and aluminium
1.04.03	knowledge of welding principles and considerations
1.04.04	knowledge of welding consumable materials such as filler rods, electrodes and inert gas
1.04.05	knowledge of licensing and training requirements
1.04.06	knowledge of government regulations
1.04.07	knowledge of ventilation requirements
1.04.08	ability to recognize flammable materials
1.04.09	ability to identify material to be welded
1.04.10	ability to perform welding and cutting procedures

1.04.11	ability to clean welding and cutting equipment
1.04.12	ability to maintain welding and cutting equipment
1.04.13	ability to store welding and cutting equipment
1.04.14	ability to identify unsafe welding and cutting equipment

Sub-task

1.05 Uses soldering/brazing equipment.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

1.05.01	knowledge of types of soldering and brazing equipment
1.05.02	knowledge of materials to be soldered or brazed such as copper, galvanized and stainless steel
1.05.03	knowledge of soldering/brazing gases such as propane, oxygen and natural gas
1.05.04	knowledge of alloys and fluxes
1.05.05	knowledge of government regulations such as Transportation of Dangerous Goods (TDG) regulations
1.05.06	knowledge of ventilation requirements
1.05.07	ability to recognize flammable materials
1.05.08	ability to match alloy to specific component for soldering or brazing
1.05.09	ability to organize soldering and brazing equipment
1.05.10	ability to select soldering and brazing equipment

1.05.11	ability to clean soldering and brazing equipment
1.05.12	ability to maintain soldering and brazing equipment
1.05.13	ability to store soldering and brazing equipment
1.05.14	ability to identify unsafe soldering and brazing equipment

Sub-task

1.06 Uses measuring and layout equipment.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

Supporting Knowledge & Abilities

1.06.01	knowledge of types of measuring and layout equipment
1.06.02	knowledge of measuring and layout equipment operating procedures
1.06.03	knowledge of imperial and metric systems
1.06.04	knowledge of geometry and trade related mathematics
1.06.05	ability to perform basic calculations such as imperial/metric conversions
1.06.06	ability to interpret measurements
1.06.07	ability to organize measuring and layout equipment
1.06.08	ability to select measuring and layout equipment
1.06.09	ability to clean measuring and layout equipment
1.06.10	ability to store measuring and layout equipment

Sub-task

1.07 Uses ladders and platforms.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

Supporting Knowledge & Abilities

1.07.01	knowledge of types of ladders such as step ladders and extension ladders
1.07.02	knowledge of types of platforms such as scaffolds, hydraulic lifts and manlifts
1.07.03	knowledge of government regulations
1.07.04	knowledge of operating procedures
1.07.05	knowledge of limitations of ladders and platforms
1.07.06	ability to secure ladders and platforms
1.07.07	ability to maintain ladders and platforms
1.07.08	ability to recognize worn, damaged or defective ladders and platforms.

Sub-task

1.08 Uses hoisting and rigging equipment.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

Supporting Knowledge & Abilities

1.08.01	knowledge of types of hoisting and rigging equipment such as cranes, material lifts and chain falls
1.08.02	knowledge of rigging equipment components such as shackles, slings and chokers
1.08.03	knowledge of government regulations
1.08.04	knowledge of operating procedures

1.08.05	knowledge of hand signals
1.08.06	knowledge of applications of hoisting and rigging equipment
1.08.07	knowledge of limitations of hoisting and rigging equipment
1.08.08	ability to recognize safe lifting locations or points
1.08.09	ability to maintain hoisting and rigging equipment
1.08.10	ability to recognize worn, damaged or defective hoisting and rigging equipment

Sub-task

1.09 Uses testing devices. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

1.09.01	knowledge of types of testing devices
1.09.02	ability to select testing device for particular application
1.09.03	ability to store testing devices
1.09.04	ability to recognize worn, damaged or defective testing devices

Sub-task

1.10 Uses computers. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

1.10.01	knowledge of computer hardware and software applications

1.10.02	ability to use applicable industry software
1.10.03	ability to create and interpret computer-generated documents

Sub-task

1.11 Uses personal protective equipment (PPE) and safety equipment.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

1.11.01	knowledge of types of PPE
1.11.02	knowledge of types of safety equipment
1.11.03	knowledge of PPE and safety equipment operation
1.11.04	knowledge of training requirements for PPE and safety equipment
1.11.05	knowledge of location of PPE and safety equipment
1.11.06	knowledge of occupational health and safety regulations
1.11.07	ability to select PPE and safety equipment
1.11.08	ability to inspect and maintain PPE and safety equipment
1.11.09	ability to store PPE and safety equipment

Task 2 **Organizes work.**

Context: *Well-organized jobs will ensure a productive and safe workplace.*

Sub-task

2.01 **Maintains safe work environment.**

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

2.01.01	knowledge of Workplace Hazardous Materials Information System (WHMIS)
2.01.02	knowledge of health and safety acts, codes and regulations
2.01.03	knowledge of company safety policies and procedures
2.01.04	knowledge of housekeeping practices
2.01.05	ability to use safety manuals and apply procedures
2.01.06	ability to recognize and report hazards
2.01.07	ability to install temporary safety protection

Sub-task

2.02 **Interprets documentation.**

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

2.02.01	knowledge of types of documentation such as specifications, codes, standards, manuals, work orders and packing slips

2.02.02	knowledge of types of safety documentation such as Material Safety Data Sheets (MSDS) and WHMIS symbols
2.02.03	knowledge of site-specific documentation such as permits and signage

Sub-task

2.03 Completes documentation.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

2.03.01	ability to complete time cards, as-builts and work orders
2.03.02	ability to complete accident reports
2.03.03	ability to record maintenance and repairs and recommendations for follow-up action

Sub-task

2.04 Interprets drawings.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

2.04.01	knowledge of types of drawings such as blueprints, shop drawings and sketches
2.04.02	knowledge of symbols
2.04.03	ability to sketch and dimension
2.04.04	ability to locate information on drawings such as dimensions, schedules and details
2.04.05	ability to interpret scale readings

Sub-task

2.05 Communicates with others.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

2.05.01	knowledge of verbal and written communication
2.05.02	knowledge of trade terminology
2.05.03	knowledge of hoisting signals
2.05.04	ability to use communication devices such as two-way radios, cell phones and fax machines
2.05.05	ability to coordinate with other trades
2.05.06	ability to communicate with related industry people
2.05.07	ability to mentor apprentices
2.05.08	ability to explain technical information in layperson's terms

Sub-task

2.06 Organizes materials.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

2.06.01	knowledge of sequence of operations
2.06.02	knowledge of inventory requirements
2.06.03	ability to maintain stock of materials such as consumables, fasteners, sheets and sealants
2.06.04	ability to estimate time and material requirements
2.06.05	ability to label materials

Sub-task

2.07 Performs basic design.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

Supporting Knowledge & Abilities

2.07.01	knowledge of components
2.07.02	knowledge of codes and regulations
2.07.03	knowledge of sheet metal applications such as heating, ventilation and air conditioning (HVAC) systems, material handling systems and roofing systems
2.07.04	ability to take installation site measurements
2.07.05	ability to determine duct size and materials
2.07.06	ability to sketch duct system

Sub-task

2.08 Performs inspection.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

Supporting Knowledge & Abilities

2.08.01	knowledge of codes and regulations
2.08.02	knowledge of installation methods
2.08.03	knowledge of fabrication methods
2.08.04	knowledge of materials
2.08.05	knowledge of intended function of system
2.08.06	knowledge of system commissioning procedures

2.08.07	ability to interpret manufacturers' specifications
2.08.08	ability to check performance, accuracy and finish against specifications

BLOCK B

SHEET METAL FABRICATION

Trends: *There is an increase in computer use for pattern development. More emphasis is being placed on safety due to legislation. More shops are using new types of computerized equipment due to affordability.*

Related Components: Material (metal and specialty materials), pop rivets, solid rivets, consumable welding products, strapping, screws, nuts, bolts, washers, gaskets, caulking, insulation, paint, lagging, adhesives, sealants, pins, hardware (such as hinges and locks).

Tools and Equipment: See Appendix A.

Task 3 **Performs pattern development.**

Context: *Pattern development is the starting point of fabrication and one of the most important steps. Sheet metal workers develop a pattern by hand or computer using one or more of the four methods of layout to build a finished product. Sheet metal workers need to be able to recognize which methods to use.*

Sub-task

3.01 **Develops pattern using triangulation method.**

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

3.01.01	knowledge of triangulation method and its applications
3.01.02	knowledge of mathematical formulas
3.01.03	knowledge of types of joints such as standing, and slip and drive
3.01.04	knowledge of types of seams such as button lock, Pittsburgh lock and groove seams
3.01.05	knowledge of seam and material thickness allowances

3.01.06	ability to visualize finished product in three dimensions
3.01.07	ability to recognize which views are required for layout

Sub-task

3.02 Develops pattern using radial line method.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

3.02.01	knowledge of radial line method and its applications
3.02.02	knowledge of mathematical formulas
3.02.03	knowledge of types of joints such as standing, and slip and drive
3.02.04	knowledge of types of seams such as button lock, Pittsburgh lock and groove seams
3.02.05	knowledge of seam and material thickness allowances
3.02.06	ability to visualize finished product in three dimensions
3.02.07	ability to recognize which views are required for layout

Sub-task

3.03 Develops pattern using parallel line method.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

3.03.01	knowledge of parallel line method and its applications

3.03.02	knowledge of mathematical formulas
3.03.03	knowledge of types of joints such as standing, and slip and drive
3.03.04	knowledge of types of seams such as button lock, Pittsburgh lock and groove seams
3.03.05	knowledge of seam and material thickness allowances
3.03.06	ability to visualize finished product in three dimensions
3.03.07	ability to recognize which views are required for layout

Sub-task

3.04 Develops pattern using simple and straight line layout.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

3.04.01	knowledge of simple layout and its applications
3.04.02	knowledge of mathematical formulas
3.04.03	knowledge of types of joints such as standing, and slip and drive
3.04.04	knowledge of types of seams such as button lock, Pittsburgh lock and groove seams
3.04.05	knowledge of seam and material thickness allowances
3.04.06	ability to visualize finished product in three dimensions
3.04.07	ability to recognize which views are used for layout

Sub-task

3.05 Develops pattern using computer technology.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

3.05.01	knowledge of basic computer skills
3.05.02	knowledge of mathematical formulas
3.05.03	knowledge of types of joints such as standing, and slip and drive
3.05.04	knowledge of types of seams such as button lock, Pittsburgh lock and groove seams
3.05.05	knowledge of seam and material thickness allowances
3.05.06	ability to visualize finished product in three dimensions
3.05.07	ability to enter measurements in identified fields

Sub-task

3.06 Labels pieces.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

3.06.01	knowledge of information to write on piece such as kink lines, bend up/down and pattern in/out
3.06.02	knowledge of company labelling practices
3.06.03	ability to identify segmented/mating points
3.06.04	ability to identify pattern for future references

Task 4 **Fabricates sheet metal components for air and material handling systems.**

Context: *Fabrication of air and material handling systems is the process of producing finished ductwork or fittings from a flat pattern or sheet using various tools.*

Sub-task

4.01 **Cuts ductwork, fittings and components.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

Supporting Knowledge & Abilities

4.01.01	knowledge of types of material such as stainless steel, galvanized steel and aluminium
4.01.02	knowledge of thickness of material
4.01.03	knowledge of bend allowances and notching
4.01.04	ability to select cutting equipment according to application
4.01.05	ability to minimize waste

Sub-task

4.02 **Forms ductwork, fittings and components.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

Supporting Knowledge & Abilities

4.02.01	knowledge of forming techniques such as bending and rolling
4.02.02	knowledge of when to use reinforcing such as cross breaking, beading and angle iron
4.02.03	knowledge of bend allowances
4.02.04	ability to select forming machine according to allowances

Sub-task

4.03 Insulates ductwork, fittings and components.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

Supporting Knowledge & Abilities

4.03.01	knowledge of types of insulation such as rigid or flexible and acoustic or thermal
4.03.02	knowledge of thickness of insulation
4.03.03	knowledge of joint and seam allowances
4.03.04	knowledge of pin placement
4.03.05	ability to determine adhesive to use
4.03.06	ability to lay out insulation and cut it to specific measurement
4.03.07	ability to apply lagging material such as mastic and perforated metal

Sub-task

4.04 Assembles ductwork, fittings and components.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

Supporting Knowledge & Abilities

4.04.01	knowledge of types of fittings to assemble such as square-to-round, elbow and offset
4.04.02	knowledge of assembly techniques such as welding, spot welding and the use of Pittsburgh locks
4.04.03	knowledge of types of joints such as standing seam, slip and drive, and patented duct connectors
4.04.04	knowledge of types of fasteners such as solid rivets, pop rivets and screws

4.04.05	ability to use fasteners
4.04.06	ability to weld
4.04.07	ability to secure seams

Sub-task

4.05 Fabricates dampers.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

4.05.01	knowledge of types of dampers such as opposed blade, parallel blade and volume damper
4.05.02	knowledge of types of hardware to use for assembly
4.05.03	ability to interpret manufacturers' specifications
4.05.04	ability to use basic mathematics
4.05.05	ability to perform layout
4.05.06	ability to cut, form and assemble dampers
4.05.07	ability to weld

Sub-task

4.06 Fabricates flexible connections.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

4.06.01	knowledge of types of flexible connectors
4.06.02	ability to perform layout
4.06.03	ability to apply forming techniques

4.06.04	ability to cut, form and assemble flexible connectors
4.06.05	ability to fasten flexible connectors using methods such as spot welding, stapling and gluing

Sub-task

4.07 Fabricates hanger systems.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

Supporting Knowledge & Abilities

4.07.01	knowledge of types of hangers such as brackets, saddles and channels
4.07.02	knowledge of load bearing capacities and specifications
4.07.03	knowledge of item to be installed
4.07.04	knowledge of types of material used for hanger systems
4.07.05	ability to interpret manufacturers' specifications
4.07.06	ability to perform layout
4.07.07	ability to use basic mathematics
4.07.08	ability to cut and assemble hanger systems
4.07.09	ability to weld

Sub-task

4.08 Fabricates equipment supports and bases.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

4.08.01	knowledge of types of equipment supports and bases such as curbs and stands
4.08.02	knowledge of types, size and weight of units
4.08.03	ability to use basic mathematics
4.08.04	ability to design equipment supports and bases
4.08.05	ability to cut and assemble equipment supports and bases
4.08.06	ability to weld
4.08.07	ability to insulate equipment supports and bases
4.08.08	ability to prime and paint equipment supports and bases

Task 5 Fabricates roofing, sheeting and cladding.

Context: Fabrication of roofing (and roofing drainage systems), sheeting and cladding is the process of producing finished products from a flat pattern or sheet using various tools.

Sub-task

5.01 Determines seams.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

5.01.01	knowledge of types of seams such as standing and lap

5.01.02	knowledge of types of materials such as copper, galvanized, pre-painted, composite materials and aluminium
5.01.03	ability to use basic mathematics

Sub-task

5.02 Cuts metal for roofing, sheeting and cladding.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

5.02.01	knowledge of types of materials such as copper, galvanized, pre-painted, composite materials and aluminium
5.02.02	knowledge of types of roofing, sheeting and cladding
5.02.03	knowledge of bend allowances
5.02.04	ability to select cutting equipment according to application
5.02.05	ability to determine girth (stretch-out)
5.02.06	ability to minimize waste

Sub-task

5.03 Forms flashing and roofing.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

5.03.01	knowledge of types of materials such as copper, galvanized, pre-painted, composite materials and aluminium
5.03.02	knowledge of types of flashing such as roof jack, coping and fascia

5.03.03	knowledge of joints such as S-joints, lap joints and standing joints
5.03.04	knowledge of bend allowances
5.03.05	knowledge of types of sealant such as silicone and caulking
5.03.06	ability to form joints
5.03.07	ability to weld, solder and seal flashing

Task 6 **Fabricates specialty products.**

Context: *This is the process of producing finished specialty products from designs using various tools. Specialty products may include kitchen equipment, medical facility products, food processing equipment, pharmaceutical laboratory products, decorative accessories and plastic products.*

Sub-task

6.01 **Determines specialty products for application and measurements.**

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

6.01.01	knowledge of types of materials such as stainless steel, copper, plastic, composite materials and aluminium
6.01.02	knowledge of allowances
6.01.03	knowledge of bend allowances
6.01.04	knowledge of forming techniques
6.01.05	knowledge of types of specialty products such as canopies, sinks and PVC fittings
6.01.06	ability to use basic mathematics
6.01.07	ability to design specialty products

Sub-task

6.02 Cuts material for specialty products.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

Supporting Knowledge & Abilities

6.02.01	knowledge of types of materials such as stainless steel, copper, plastic, composite materials and aluminium
6.02.02	knowledge of pattern development
6.02.03	knowledge of thickness of material
6.02.04	knowledge of allowances
6.02.05	knowledge of bend allowances
6.02.06	ability to select cutting equipment according to application
6.02.07	ability to minimize waste

Sub-task

6.03 Forms specialty products.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

Supporting Knowledge & Abilities

6.03.01	knowledge of forming techniques such as bending, rolling and heat forming
6.03.02	knowledge of bend allowances
6.03.03	ability to select forming machine and hand tools

Sub-task

6.04 Assembles products.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

6.04.01	knowledge of specialty products such as sinks, canopies and PVC fittings
6.04.02	knowledge of assembly techniques such as welding, spot welding and gluing
6.04.03	knowledge of types of fasteners such as solid rivets, pop rivets, bolts and screws
6.04.04	ability to insulate panels
6.04.05	ability to weld metal
6.04.06	ability to secure seams with fasteners

Sub-task

6.05 Finishes material.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

6.05.01	knowledge of types of materials such as stainless steel, copper and aluminium
6.05.02	knowledge of types of finishes such as brushed, mirrored and dull
6.05.03	ability to use specialty tools such as grinders and sanders
6.05.04	ability to perform specialty product painting preparation such as grinding welds, removing slag and splatter, and degreasing

BLOCK C

AIR AND MATERIAL HANDLING SYSTEM INSTALLATION

Trends: *Increases in fuel costs are placing higher expectations on installation efficiencies in the trade. There is an increased use of manufactured wear plate and abrasive resistant material to reduce replacement costs.*

Related Components: Chimney, breeching, venting, louvers, grilles, diffusers, registers, fire dampers, splitter dampers, backdraft dampers, motorized dampers, volume dampers, smoke dampers, filter racks, duct heaters, coils, furnaces, rooftop units, air conditioners, exhaust fans, humidifiers, unit heaters, heat recovery ventilators, mixing boxes, variable air volume boxes, radiator covers, filter banks, drain pans, burglar bars, air valves, silencers, flexible duct, test ports, access doors, temporary caps, acoustic plenums, acoustic insulation, thermal insulation, lagging, cladding, hoppers, hoods, bins, cyclones, bag houses, conveyor skirting, lagging, hangers, braces, mounting brackets, threaded rod, hang wire, channel, round rod, beam clamps, concrete shields, nails, pins, screws, rivets, tape, glue, nuts, bolts.

Tools and Equipment: Hand tools, portable power tools, measuring tools, ladders, platforms, hoisting and rigging equipment, personal protective equipment and safety equipment, testing equipment.

Task 7 Installs chimneys, breeching and venting.

Context: *Chimneys are used to direct gases, smoke and other products of combustion into the atmosphere. Breeching and venting connect one or more appliances to the chimney. Proper installation methods are important to ensure indoor and outdoor air quality and safety. Sheet metal workers may also install cladding on to mechanical equipment, stacks and pipes to address safety concerns, limit operating costs, increase the efficiency of equipment through the conservation of energy, and protect insulation from damage due to exposure to the elements.*

Sub-task

7.01 Installs bracing, hangers and supports.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

7.01.01	knowledge of code and manufacturers' specifications for requirements such as clearances, weight, spacing and seismic upgrading
7.01.02	knowledge of building materials
7.01.03	ability to select and use fasteners such as screws, nails, shields and beam clamps

Sub-task

7.02 Installs flashing.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

7.02.01	knowledge of types of flashing
7.02.02	knowledge of types of weatherproofing materials
7.02.03	ability to select flashing for different applications
7.02.04	ability to fasten flashing

Sub-task

7.03 Connects chimney to appliance.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

7.03.01	knowledge of codes and regulations
7.03.02	knowledge of types of sealants
7.03.03	knowledge of sheet metal materials used for chimneys, breeching and venting
7.03.04	knowledge of types of appliances such as furnaces, stoves and incinerators
7.03.05	ability to interpret manufacturers' specifications
7.03.06	ability to fasten chimney

Sub-task

7.04 Installs cladding and lagging to mechanical components.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

7.04.01	knowledge of types of cladding and lagging materials such as stainless steel, aluminium, coated steel, membrane and plastic
7.04.02	knowledge of types of insulation and their applications
7.04.03	knowledge of cladding components such as end caps, buttstraps and preformed elbows
7.04.04	knowledge of mechanical equipment and components such as boilers, piping and pressure vessels

7.04.05	knowledge of cladding requirements
7.04.06	knowledge of thermal expansion and contraction of material
7.04.07	knowledge of the effect of weather conditions on material and installation
7.04.08	ability to lay out patterns for elbows, tapers and cylinders
7.04.09	ability to cut, fit and secure components

Task 8 **Installs air and material handling system sheet metal components.**

Context: *Sheet metal workers install air handling systems to ensure comfort and air quality. Material handling systems are installed to ensure maximum efficiency of movement of material.*

Sub-task

8.01 **Prepares installation site.** **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

8.01.01	knowledge of codes and regulations
8.01.02	ability to interpret manufacturers' specifications
8.01.03	ability to analyze task to determine equipment requirements
8.01.04	ability to perform site measurements
8.01.05	ability to determine sizes and locations of penetrations
8.01.06	ability to coordinate with other trades
8.01.07	ability to identify sizes and positions of hangers, braces and brackets
8.01.08	ability to establish location of system components

Sub-task

8.02 Installs hangers, braces and brackets.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

8.02.01	knowledge of code and manufacturers' specifications for requirements such as clearances, weight and spacing
8.02.02	knowledge of building materials
8.02.03	ability to fasten hangers, braces and brackets

Sub-task

8.03 Installs sheet metal ducts and fittings.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

8.03.01	knowledge of principles of HVAC systems
8.03.02	knowledge of principles of material handling systems
8.03.03	knowledge of the effect of weather conditions on material and installation
8.03.04	ability to use joints and connections such as standing, and slip and drive
8.03.05	ability to cut duct
8.03.06	ability to fasten duct to hangers, braces and brackets
8.03.07	ability to plumb and level duct

Sub-task

8.04 Finishes seams, joints and penetrations.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

8.04.01	knowledge of types of materials for sealing such as oil-based, solvent-based, water-based, tapes and caulking
8.04.02	knowledge of codes and regulations
8.04.03	ability to interpret manufacturers' specifications
8.04.04	ability to select sealant for application
8.04.05	ability to use various sealing techniques such as welding, soldering, caulking and taping
8.04.06	ability to close gaps around penetrations

Sub-task

8.05 Applies insulation and cladding to outside of ducting.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

8.05.01	knowledge of types of insulation such as thermal and fire-rated
8.05.02	knowledge of types of cladding such as aluminium, stainless steel and canvas
8.05.03	knowledge of codes and regulations
8.05.04	ability to interpret manufacturers' specifications
8.05.05	ability to fasten insulation and cladding

Task 9 **Installs air handling system components.**

Context: *There are many components manufactured to be installed in air handling systems. They can be used for climate control, humidity control, indoor air quality, security and fire prevention.*

Sub-task

9.01 **Installs air handlers.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

Supporting Knowledge & Abilities

9.01.01	knowledge of types of air handlers such as furnaces, fans, rooftop units, built-up systems and air conditioners
9.01.02	knowledge of the effect of weather conditions on material and installation
9.01.03	ability to interpret manufacturers' specifications
9.01.04	ability to install curbs, sleepers and stands
9.01.05	ability to install isolators such as inertia bases, isolation springs and isolation pads

Sub-task

9.02 **Installs dampers.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

Supporting Knowledge & Abilities

9.02.01	knowledge of types of dampers and their applications such as volume, smoke, motorized and backdraft
9.02.02	knowledge of codes and regulations
9.02.03	knowledge of duct system
9.02.04	ability to interpret manufacturers' specifications
9.02.05	ability to fasten dampers

9.02.06	ability to check fit and operation of dampers
9.02.07	ability to use sealants

Sub-task

9.03 Installs fire dampers.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

9.03.01	knowledge of codes and regulations
9.03.02	knowledge of fire damper sleeves
9.03.03	ability to interpret manufacturers' specifications
9.03.04	ability to install break-away joints
9.03.05	ability to select and install fusible links
9.03.06	ability to install retaining angle
9.03.07	ability to install access doors for visible inspection of fusible links

Sub-task

9.04 Installs registers, grilles, diffusers and louvers.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

9.04.01	knowledge of types and applications of registers, grilles, diffusers and louvers
9.04.02	knowledge of HVAC systems
9.04.03	ability to interpret manufacturers' specifications

9.04.04	ability to fasten registers, grilles, diffusers and louvers
9.04.05	ability to use sealants

Sub-task

9.05 Installs coils.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

9.05.01	knowledge of codes and regulations
9.05.02	knowledge of types of coils such as electric, hydronic and direct expansion
9.05.03	knowledge of HVAC systems
9.05.04	knowledge of refrigeration principles
9.05.05	ability to interpret manufacturers' specifications
9.05.06	ability to secure coils
9.05.07	ability to select and apply sealants
9.05.08	ability to install access doors
9.05.09	ability to install drain pans

Sub-task

9.06 Installs heat and energy recovery ventilators.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

9.06.01	knowledge of codes and regulations
9.06.02	knowledge of HVAC systems

9.06.03	knowledge of heat recovery ventilator applications
9.06.04	knowledge of energy recovery ventilator applications
9.06.05	knowledge of types of filters for heat and energy recovery ventilators
9.06.06	ability to interpret manufacturers' specifications
9.06.07	ability to install hanging hardware and stands

Sub-task

9.07 Installs system component accessories.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

9.07.01	knowledge of accessories such as humidifiers, silencers, air valves, variable air volume boxes, mixing boxes, filter banks, drain pans, burglar bars, access doors, flexible duct, acoustic plenums and unit heaters
9.07.02	knowledge of codes and regulations
9.07.03	knowledge of location for installing accessories
9.07.04	ability to interpret manufacturers' specifications for accessories
9.07.05	ability to select and apply sealants

Task 10 **Installs material handling system components.**

Context: *Material handling system components may be installed for safety, cleanliness and cost-savings. These components may have specific applications such as dust collection and product separation and movement.*

Sub-task

10.01 **Installs equipment supports and bases.**

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

10.01.01	knowledge of dimension and weight of unit
10.01.02	knowledge of orientation and location of unit
10.01.03	ability to secure equipment supports and bases

Sub-task

10.02 **Installs fans.**

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

10.02.01	knowledge of types of fans such as axial, centrifugal, backward inclined and paddle
10.02.02	knowledge of codes and regulations
10.02.03	knowledge of material handling systems
10.02.04	knowledge of air flow
10.02.05	ability to interpret manufacturers' specifications
10.02.06	ability to secure fans

Sub-task

10.03 Installs collection devices.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

Supporting Knowledge & Abilities

10.03.01	knowledge of material handling systems
10.03.02	knowledge of codes and regulations
10.03.03	knowledge of collection devices such as hoppers, hoods and bins
10.03.04	knowledge of the effect of weather conditions on material and installation
10.03.05	ability to interpret manufacturers' specifications
10.03.06	ability to position collection devices
10.03.07	ability to secure collection devices

Sub-task

10.04 Installs separating devices.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

Supporting Knowledge & Abilities

10.04.01	knowledge of material handling systems
10.04.02	knowledge of codes and regulations
10.04.03	knowledge of separating devices such as cyclones, bag houses and conveyor skirting
10.04.04	knowledge of the effect of weather conditions on material and installation
10.04.05	ability to interpret manufacturers' specifications

10.04.06	ability to position separating devices
10.04.07	ability to fasten separating devices

Task 11 Performs testing, adjusting and balancing.

Context: Sheet metal workers perform testing, adjusting and balancing to ensure the system operates at its specified performance level.

Sub-task

11.01 Performs leak tests.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	no	NV	yes	NV

Supporting Knowledge & Abilities

11.01.01	knowledge of types of leak tests such as smoke, dye, pressure, fluid, visual and audible
11.01.02	knowledge of charts for leak tests
11.01.03	ability to select test for a specific application
11.01.04	ability to apply testing procedures according to specifications
11.01.05	ability to prepare system for testing such as applying temporary caps, access doors and test ports

Sub-task

11.02 Performs air balancing.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	no	NV	yes	NV

Supporting Knowledge & Abilities

11.02.01	knowledge of air balancing instruments
11.02.02	knowledge of air balancing techniques

11.02.03	knowledge of HVAC and material handling systems
11.02.04	knowledge of damper locations
11.02.05	knowledge of thermal overload
11.02.06	ability to check and adjust dampers
11.02.07	ability to check RPMs
11.02.08	ability to check rotation
11.02.09	ability to check and adjust belts, pulleys and sheaves
11.02.10	ability to install test ports
11.02.11	ability to check amperage
11.02.12	ability to take velocity readings
11.02.13	ability to test run system

BLOCK D

ROOFING, ARCHITECTURAL METAL AND SPECIALTY PRODUCT INSTALLATION

Trends: *The use of exterior sheet metal products is driven by the economic fluctuations in the country. There is an increase in the use of sheet metal products such as copper roofs in the residential and commercial sectors.*

Related Components: Flashing, coping, gutters, downspouts, conductors, scuppers, fasteners, sealants, sheet and batten, closures, fascia, awnings, canopies, finials, insulation, waterproof membranes, isolation membranes, pre-formed and roll-formed decking, sheeting and roofing products, lagging, cladding, kitchen hoods, backsplashes, countertops, laboratory components, medical facility products, food processing products, guards, signage, brackets, cleaning compounds, abrasives.

Tools and Equipment: Hand tools, portable power tools, welding, brazing, soldering and cutting equipment, measuring tools, ladders, platforms, hoisting and rigging equipment, personal protective equipment and safety equipment.

Task 12 **Installs metal roofing and cladding systems.**

Context: *Sheet metal workers install metal roofing and cladding products to provide low maintenance, longevity of the building and protection from the elements. Metal roofs and cladding can also add to the aesthetics of the building.*

Sub-task

12.01 **Lays out roof and walls.**

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

12.01.01 knowledge of types of roof structures such as pitched, tapered, domes and spires

12.01.02 knowledge of roof construction features such as hips, ridges and valleys

12.01.03 knowledge of access doors

12.01.04 knowledge of roof and wall materials and characteristics

12.01.05	knowledge of final appearance of roof and wall
12.01.06	ability to check roof and wall for square
12.01.07	ability to establish starting point for layout
12.01.08	ability to establish reference lines using methods such as snap lines, string lines and lasers
12.01.09	ability to minimize waste

Sub-task

12.02 Installs insulation, waterproof membrane, isolation material and building envelope.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

12.02.01	knowledge of types of insulation such as fibreglass, styrofoam and fibreboard
12.02.02	knowledge of types of waterproof membranes such as mastic and plastic
12.02.03	knowledge of isolation materials such as wood blocks, plastic, felt paper, rubber and mineral surface
12.02.04	knowledge of air and vapour barriers
12.02.05	knowledge of fasteners such as screws, nails and staples
12.02.06	knowledge of manufacturers' recommended installation methods
12.02.07	ability to cut, fit, secure and seal materials

Sub-task

12.03 Installs roofing and cladding system components.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

12.03.01	knowledge of types of roof and wall panels such as standing seam, batten and snap lock
12.03.02	knowledge of fasteners such as concealed and exposed clips, screws, washer nails and cleats
12.03.03	knowledge of thermal expansion and contraction of material
12.03.04	knowledge of the effect of weather conditions on material and installation
12.03.05	knowledge of roofing components such as expansion joints, flashings and gutters
12.03.06	ability to cut, fit and secure components
12.03.07	ability to use reference lines to verify installation

Sub-task

12.04 Seals exposed joints.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

12.04.01	knowledge of sealants such as caulking, solder, butyl, silicone and mastic
12.04.02	knowledge of manufacturers' recommendations for application
12.04.03	knowledge of locations requiring sealing
12.04.04	ability to select sealant for application
12.04.05	ability to apply sealant in a consistent manner

Sub-task

12.05 Installs decking.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

12.05.01	knowledge of types of decking such as metal pan and Q decking
12.05.02	knowledge of material to be applied on decking such as roofing, concrete, wood and insulation
12.05.03	ability to determine material required
12.05.04	ability to cut and fit decking
12.05.05	ability to fasten decking using welding equipment, screws and dimple tools
12.05.06	ability to measure, fabricate and install forms around openings
12.05.07	ability to finish exposed welds

Task 13 Installs exterior components.

Context: Sheet metal workers install metal exterior components such as awnings, mechanical fences and signage for functional and aesthetic reasons.

Sub-task

13.01 Prepares surface.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

13.01.01	knowledge of types of exterior surfaces such as concrete, metal, stone, wood and composite

13.01.02	knowledge of surface preparation such as cleaning, filling voids, grouting mortar lines and scoring surface for adherence
13.01.03	knowledge of cleaning compounds and abrasives
13.01.04	ability to apply or repair waterproofing membrane

Sub-task

13.02 Fastens exterior components. **Supporting Knowledge & Abilities**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

13.02.01	knowledge of exterior components such as awnings, finials, signage, decorative fascia and canopies
13.02.02	knowledge of fasteners such as anchors, nail-ins, screws and adhesives
13.02.03	knowledge of compatibility of fasteners and components
13.02.04	knowledge of final appearance of component
13.02.05	ability to identify attachment point
13.02.06	ability to modify components to suit application
13.02.07	ability to select and apply fasteners
13.02.08	ability to seal components

Task 14 Installs specialty products.

Context: Sheet metal workers install these products in locations such as commercial kitchens, food processing plants, pharmaceutical laboratories, medical facilities and manufacturing plants.

Sub-task

14.01 Installs stainless steel specialty products.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

Supporting Knowledge & Abilities

14.01.01	knowledge of kitchen preparation products such as hoods, backsplashes and countertops
14.01.02	knowledge of pharmaceutical laboratory products such as tanks, conveyors and laboratory components
14.01.03	knowledge of food processing products such as flumes, guards and chutes
14.01.04	knowledge of medical facility products such as laundry chutes, counters and cupboards
14.01.05	knowledge of codes and regulations
14.01.06	knowledge of food grade caulking, solders and welding materials
14.01.07	ability to interpret manufacturers' specifications
14.01.08	ability to follow manufacturers' installation instructions
14.01.09	ability to finish products to sanitary requirements

Sub-task

14.02 Installs non-stainless steel products.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

Supporting Knowledge & Abilities

14.02.01	knowledge of non-stainless steel metals such as aluminium and copper
14.02.02	knowledge of plastic products such as laboratory exhaust systems and sneeze shields
14.02.03	knowledge of codes and regulations
14.02.04	knowledge of fasteners
14.02.05	ability to interpret manufacturers' specifications
14.02.06	ability to select installation procedures to suit product
14.02.07	ability to follow manufacturers' installation procedures
14.02.08	ability to select and apply sealant

BLOCK E

MAINTENANCE AND REPAIR

Trends: *There is an increase in the use of electronic diagnostic equipment for the maintenance of appliances. The use of electronic modules results in easier and quicker repairs. There is an increasing need for training in electronic modules.*

Related Components: Ductwork, furnaces, air conditioners, rooftop units, makeup air units, fans, dampers, belts, pulleys, bearings, blower wheels, electronic and mechanical controls, filters, vents, humidifiers, scrubbers, lubricants.

Tools and Equipment: See Appendix A.

Task 15 Performs scheduled maintenance.

Context: *Sheet metal workers perform scheduled maintenance in order to minimize repair costs, increase longevity and enhance system performance.*

Sub-task

15.01 Performs maintenance inspection.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	no	NV	yes	NV

15.01.01	knowledge of normal operation and appearance of components
15.01.02	ability to identify abnormal sounds, vibration, smells and heat build-up
15.01.03	ability to identify sources of abnormality
15.01.04	ability to recognize abnormal wear or fatigue

Sub-task

15.02 Services components.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	no	NV	yes	NV

15.02.01	knowledge of components such as belts, pulleys, bearings, fan blades, filters and motors
15.02.02	knowledge of frequency of scheduled maintenance
15.02.03	ability to change and clean filters
15.02.04	ability to lubricate bearings and motors
15.02.05	ability to adjust belts, pulleys and motors
15.02.06	ability to clean fan blades, motors and bearings

Task 16 Repairs faulty systems and components.

Context: Sheet metal workers repair sheet metal systems to restore them to normal operation and specifications.

Sub-task

16.01 Identifies worn, faulty or missing components.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	yes	NV	yes	NV

16.01.01	knowledge of normal operation and appearance of components
16.01.02	knowledge of diagnostic methods such as sensory inspections and use of testing devices

16.01.03	ability to interpret data gained from diagnostic methods
16.01.04	ability to determine cause of fault

Sub-task

16.02 Repairs worn, faulty or obsolete components.

Supporting Knowledge & Abilities

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	yes	yes	yes	yes	no	NV	yes	NV

16.02.01	knowledge of sequence for removing and replacing components such as ductwork, material handling components, filters, belts and pulleys
16.02.02	knowledge of patching methods such as welding, riveting and bonding
16.02.03	ability to remove existing components
16.02.04	ability to select replacement components
16.02.05	ability to verify compatibility of new components
16.02.06	ability to modify replacement components
16.02.07	ability to coordinate replacement of components
16.02.08	ability to apply patches to components using materials such as tape, sealants and base metals
16.02.09	ability to verify repair

APPENDICES

TOOLS AND EQUIPMENT

Hand Tools

adjustable wrench
Allen hex keys
aviation snips R.H. and L.H.
ball peen hammer
banding tools
bulldog snips
bumping hammer
caulking gun
C-clamp
center punch
chalk line
chipping hammer
chisels
combination snip
divider
drift pin
duct puller/stretcher
files
groove seamer – hand groover
hacksaw
hand crimpers
hand dolly
hand notcher
hole punch
levels
locking pliers
mallett
marking pen
paint brush
pipe wrench
pliers
plumb bob
pop riveter
prick punch
rivet set
riveting hammer
scraper
scratch awl
screwdriver
scriber
setting hammer
side cutters
socket set
soldering copper
straight edge
tap and die
wire and bolt cutters
wire brushes
wrenches

Portable Power Tools

air compressor
angle drill
angle grinder
circular saw
cordless drill
die grinder
double cutter
electric drill
generator
hammer drill
impact wrench
jigsaw
nibbler
paint spray gun
pneumatic hammer
pneumatic riveter
polisher and buffer
portable band saw
portable plasma cutter
powder actuated tool
power washer
reciprocating saw
seamer
unishear

Shop Tools and Equipment

abrasive cut-off saw
angle iron roller
band iron bender
band saw
bar folder
box and pan brake
button lock machine
cleat folder
cleat machine
cold cut saw
cut to length line
dimpler
drill index
drill press
foot shear
grinder
hand brake
hydraulic press
jig
lever bench shear
magnetic brake
notcher
pattern
pin spotter
pipe-threader, cutter, reamer
pittsburgh machine
power brake
power notcher
power press
power punch
power roll former
power sander or polisher
power shear
rivet press
riveting gun
rotary punch
slitter
snap-lock machine
spiral duct machine
TDC machine

Rotary Machines

beading machine
burring machine
combination bending and crimping machine
double seaming equipment
easy edger
elbow seaming
ring and circle shears
slip roll former
turning machine
wiring machine

Metal Forming Stakes

beak horn
blow horn
candle mould
common square
copper smith
creasing stake
double seaming
double seaming with heads
hatchet
hollow mandrel
solid mandrel
square

Welding, Brazing, Soldering and Cutting Equipment

AC power unit
AC/DC power unit
butane torch
MIG welding equipment (GMAW)
oxy-acetylene welding equipment
shielded metal arc welding (SMAW) equipment
soldering furnace or pot
soldering iron

Welding, Brazing, Soldering and Cutting Equipment (continued)

spot welder
TIG welding equipment (GTAW)
tiger torch

Layout and Drafting Equipment

beam compass
circumference rule
combination square
compass
divider
drafting arm
drafting pencil
drafting table
eraser shield
framing square
parallel bar
protractor
scale ruler
set square
stencil
template
trammel points
triangle
T-square

Measuring Tools

angle finder
angle rule
bench rule
caliper
laser level
micrometer
tape measure
transit level
vernier caliper

Ladders, Platforms, and Hoisting and Rigging Equipment

cable
chain falls
chain hoist
chokers
come-along
fork lift
hydraulic hoist
ladders
manlift
material lift
overhead crane
rope
scaffolds
scissor lift
shackles
slings
tirfor

Testing Equipment

ammeter
amprobe
anemometer
calibrated flow hood
CO^2 tester
digital combustion analyzer
digital multimeter
digital thermometer
duct thermometer
grommet or plug

Testing Equipment (continued)

high pressure duct tester
hygrometer
inclined manometer
magnehelic pressure gauge
mechanical tachometer
micro amp meter
millivolt meter
monoxor (CO tester)
multimeter
O^2 tester
ohmmeter
pitot tube
pressure gauge
psychrometer
smoke tester
stack thermometer
stop watch
strobe tachometer
U tube manometer
velometer

Computer Assisted Tools

computer hardware
digital camera
laser cutter
numerical control/computer numerical control equipment (NC/CNC)
plasma cutter
printer
software packages
water jet

Personal Protective Equipment and Safety Equipment

eye protection
eye wash station
face shield
fall arrest equipment
fire extinguisher
first aid kit
gloves
hard hat
hearing protection
leather apron
reflective vest
respiratory protection
safety boots
welding curtain
welding jacket

ACRONYMS

HVAC	heating, ventilation and air conditioning
MSDS	Material Safety Data Sheet
RPM	revolutions per minute
TDG	Transportation of Dangerous Goods
TDC	transverse duct connectors
WHMIS	Workplace Hazardous Materials Information System

BLOCKS AND TASKS WEIGHTING

BLOCK A OCCUPATIONAL SKILLS

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	35	15	NV	12	NV	20	30	20	30	20	NV	20	NV	22%

Task 1 Uses tools and equipment.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	70	70	NV	66	NV	40	85	70	60	90	NV	60	NV	68%

Task 2 Organizes work.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	30	30	NV	34	NV	60	15	30	40	10	NV	40	NV	32%

BLOCK B SHEET METAL FABRICATION

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	25	30	NV	34	NV	25	26	15	25	25	NV	35	NV	27%

Task 3 Performs pattern development.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	40	40	NV	33	NV	25	25	35	30	20	NV	35	NV	32%

Task 4 Fabricates sheet metal components for air and material handling systems.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	30	30	NV	35	NV	45	48	35	40	55	NV	35	NV	39%

Task 5 Fabricates roofing, sheeting and cladding.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	17	15	NV	16	NV	10	17	15	15	10	NV	15	NV	14%

Task 6 Fabricates specialty products.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	13	15	NV	16	NV	20	10	15	15	15	NV	15	NV	15%

BLOCK C AIR AND MATERIAL HANDLING SYSTEM INSTALLATION

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	25	30	NV	32	NV	40	26	45	30	35	NV	25	NV	32%

Task 7 Installs chimneys, breeching and venting.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	7	10	NV	12	NV	10	10	5	20	15	NV	15	NV	12%

Task 8 Installs air and material handling system sheet metal components.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	33	30	NV	35	NV	30	50	60	30	40	NV	30	NV	37%

Task 9 Installs air handling system components.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	35	25	NV	26	NV	30	25	23	25	30	NV	25	NV	27%

Task 10 Installs material handling system components.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	17	25	NV	15	NV	20	10	10	15	15	NV	25	NV	17%

Task 11 Performs testing, adjusting and balancing.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	8	10	NV	12	NV	10	5	2	10	0	NV	5	NV	7%

BLOCK D ROOFING, ARCHITECTURAL METAL AND SPECIALTY PRODUCT INSTALLATION

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	9	20	NV	12	NV	10	12	15	8	15	NV	15	NV	13%

Task 12 Installs metal roofing and cladding systems.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	50	50	NV	41	NV	40	57	50	34	20	NV	20	NV	40%

Task 13 Installs exterior components.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	7	15	NV	26	NV	30	28	20	33	20	NV	30	NV	23%

Task 14 Installs specialty products.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	43	35	NV	33	NV	30	15	30	33	60	NV	50	NV	37%

BLOCK E MAINTENANCE AND REPAIR

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	6	5	NV	10	NV	5	6	5	7	5	NV	5	NV	6%

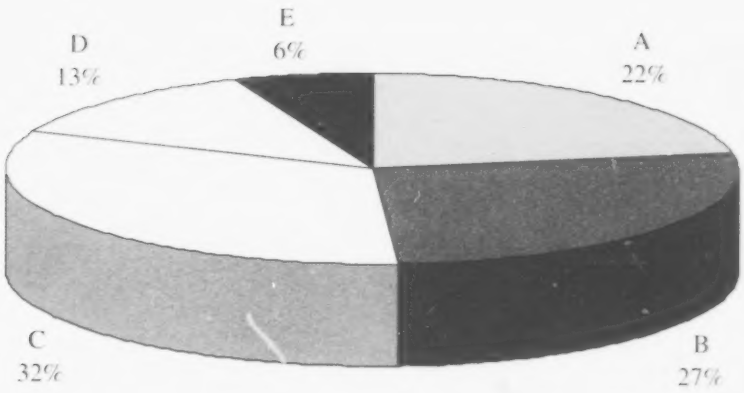
Task 15 Performs scheduled maintenance.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	43	50	NV	45	NV	60	50	25	40	70	NV	50	NV	48%

Task 16 Repairs faulty systems and components.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	57	50	NV	55	NV	40	50	75	60	30	NV	50	NV	52%

PIE CHART*



TITLES OF BLOCKS

Block A	Occupational Skills	Block D	Roofing, Architectural Metal and Specialty Product Installation
Block B	Sheet Metal Fabrication	Block E	Maintenance and Repair
Block C	Air and Material Handling System Installation		

* Average percentage of the total number of questions on an interprovincial examination, assigned to assess each block of the analysis, as derived from the collective input from workers within the occupation from all areas of Canada. Interprovincial examinations typically have from 100 to 150 multiple-choice questions.

TASK PROFILE CHART – SHEET METAL WORKER (2006)

BLOCKS	TASKS	SUB-TASKS					
A OCCUPATIONAL SKILLS	**1. Uses tools and equipment.**	1.01 Uses hand tools.	1.02 Uses portable power tools.	1.03 Uses shop tools and equipment.	1.04 Uses welding/cutting equipment.	1.05 Uses soldering/brazing equipment.	1.06 Uses measuring and layout equipment.
		1.07 Uses ladders and platforms.	1.08 Uses hoisting and rigging equipment.	1.09 Uses testing devices.	1.10 Uses computers.	1.11 Uses personal protective equipment (PPE) and safety equipment.	
	2. Organizes work.	2.01 Maintains safe work environment.	2.02 Interprets documentation.	2.03 Completes documentation.	2.04 Interprets drawings.	2.05 Communicates with others.	2.06 Organizes materials.
		2.07 Performs basic design.	2.08 Performs inspection.				
B SHEET METAL FABRICATION	**3. Performs pattern development.**	3.01 Develops pattern using triangulation method.	3.02 Develops pattern using radial line method.	3.03 Develops pattern using parallel line method.	3.04 Develops pattern using simple and straight line layout.	3.05 Develops pattern using computer technology.	3.06 Labels pieces.
	4. Fabricates sheet metal components for air and material handling systems.	4.01 Cuts ductwork, fittings and components.	4.02 Forms ductwork, fittings and components.	4.03 Insulates ductwork, fittings and components.	4.04 Assembles ductwork, fittings and components.	4.05 Fabricates dampers.	4.06 Fabricates flexible connections.
		4.07 Fabricates hanger systems.	4.08 Fabricates equipment supports and bases.				
	5. Fabricates roofing, sheeting and cladding.	5.01 Determines seams.	5.02 Cuts metal for roofing, sheeting and cladding.	5.03 Forms flashing and roofing.			

SHEET METAL WORKER (2006)

BLOCKS	TASKS	SUB-TASKS					
	6. Fabricates specialty products.	6.01 Determines specialty products for application and measurements.	6.02 Cuts material for specialty products.	6.03 Forms specialty products.	6.04 Assembles products.	6.05 Finishes material.	
C AIR AND MATERIAL HANDLING SYSTEM INSTALLATION	7. Installs chimneys, breeching and venting.	7.01 Installs bracing, hangers and supports.	7.02 Installs flashing.	7.03 Connects chimney to appliance.	7.04 Installs cladding and lagging to mechanical components.		
	8. Installs air and material handling system sheet metal components.	8.01 Prepares installation site.	8.02 Installs hangers, braces and brackets.	8.03 Installs sheet metal ducts and fittings.	8.04 Finishes seams, joints and penetrations.	8.05 Applies insulation and cladding to outside of ducting.	
	9. Installs air handling system components.	9.01 Installs air handlers.	9.02 Installs dampers.	9.03 Installs fire dampers.	9.04 Installs registers, grilles, diffusers and louvers.	9.05 Installs coils.	9.06 Installs heat and energy recovery ventilators.
		9.07 Installs system component accessories.					
	10. Installs material handling system components.	10.01 Installs equipment supports and bases.	10.02 Installs fans.	10.03 Installs collection devices.	10.04 Installs separating devices.		
	11. Performs testing, adjusting and balancing.	11.01 Performs leak tests.	11.02 Performs air balancing.				
D ROOFING, ARCHITECTURAL METAL AND SPECIALTY PRODUCT INSTALLATION	12. Installs metal roofing and cladding systems.	12.01 Lays out roof and walls.	12.02 Installs insulation, waterproof membrane, isolation material and building envelope.	12.03 Installs roofing and cladding system components.	12.04 Seals exposed joints.	12.05 Installs decking.	

BLOCKS	TASKS	SUB-TASKS	
	13. Installs exterior components.	13.01 Prepares surface.	13.02 Fastens exterior components.
	14. Installs specialty products.	14.01 Installs stainless steel specialty products.	14.02 Installs non-stainless steel products.
E MAINTENANCE AND REPAIR	15. Performs scheduled maintenance.	15.01 Performs maintenance inspection.	15.02 Services components.
	16. Repairs faulty systems and components.	16.01 Identifies worn, faulty or missing components.	16.02 Repairs worn, faulty or obsolete components.